WQB "Wide Aperture Quad" for Main Injector

4 August 2005, 9:00 AM
IB2 conference room

Attendees: Linda Alsip, Weiren Chou, TJ Gardner, Dave Harding, Jim Jablonski, Vladimir Kashikhin, Dave Johnson, Bill Robotham, Linda Valerio

Measurements

Dave showed graphs from a spreadsheet that Hank had prepared summarizing measurements on WQB001-1. These include an excitation curve up to 1000 A on center and rotating Morgan coil harmonics measurements on center and at +/- 0.98".

At low current, up to 1000 A, the behavior is as expected. The effective length is about 9/16" too long, but there are eight of 1/16" shims behind the removable pole tips at each end. We will not change the length until after agreeing on the pole end shape and doing measurements at full current. The target remains to match the integrated field at 2800 A (120 GeV). See the plots of "strength" and "nonlin strength".

As expected, the four-fold symmetry, larger aperture, and careful assembly have reduced the harmonics on center. See the plot "harmonics chart".

The on and off center harmonics can be used to recreated the integrated gradient as a function of position. See the plot "gradient shape". Note that the calculated gradient extends out to the probe radius and only includes harmonic terms up to 12-pole. To get a good measurement out to the edge of the design good field region will require a stretched wire measurement. The acceptance criterion was based on the deviation of the field from linear, not the deviation of the gradient from constant. Hank and Dave will provide the field deviations.

The next step will be a body/end separation by measuring the integrated field and harmonics, integrating from $-\infty$ to z for each of several values of z. The slope of this line gives the body field and the z intercept gives the effective length of the end. We will see if we can squeeze in a stretched wire measurement. By the time that is done, we expect to have WQB002-0 ready to be measured at full current.

Design

The crossover bus on WQB002 will be 1.25" diameter copper in place of the previous 0.625". TD is also considering a water-cooled crossover.

Procurement

We are in good shape, but a decision is needed as soon as possible on how many more pole tip shims to fabricate. We have enough for two magnets at the level that they were installed in the first two magnets. Assuming the initial measurements hold up, we need half that many shims so we have enough for four magnets. It was agreed to start work on enough shims to cover all magnets at that level. We also need to decide what to do with the pole end pieces. We have a full set of blanks for one magnet and enough pieces with a simple chamfer for the whole run.

Fabrication

WQB001 is at MTF.

WQB002 has been painted and the new bus work is being installed.

WQB003 has all coils wound and potted and all cores stacked. Two quarter magnet assemblies are in the rollover fixture and the other two quarters are being prepared.

WQB004 has winding and stacking under way.

Schedule

If the initial shape and the revised crossover bus prove satisfactory, we might have WQB002 ready for alignment and installation by the end of August. If we don't run into new obstacles, completing seven magnets by the end of October is quite plausible.

BPM's

The BPM order was slowed by receiving a low bid significantly over the estimate. The promised delivery is the end of August for all seven units. AD is trying to negotiate delivery of a first article earlier.

Next meeting: 11 August 2005, 9:00 in the Industrial Building 2 conference room.
No meeting 18 August.